

## WISCONSIN DIVISION OF PUBLIC HEALTH GUIDELINES: INVASIVE MENINGOCOCCAL DISEASE

### OVERVIEW OF MENINGOCOCCAL DISEASE

- Infectious agent (bacteria): *Neisseria meningitidis*
  - Gram-negative diplococci
  - Of the 13 meningococcal serogroups, serogroups A, B, C, Y, and W-135 are the most frequently implicated in invasive disease.
  - Serogroup distribution
    - Serogroups B, C, and Y each account for approximately 30% of reported cases in the United States.
    - Serogroup A is associated with epidemics outside of the US especially in sub-Saharan Africa
    - Serogroup W-135 accounts for <5% of reported cases in the world although has been associated with outbreaks in sub-Saharan Africa and among pilgrims to the Hajj, an annual pilgrimage to the major holy places of Islam.
- Case Definition of meningococcal disease in Wisconsin: At least one of the following criteria occurring in a Wisconsin resident with a clinically compatible illness
  - *N. meningitidis* isolated from a normally sterile site:
    - Isolation is generally from cerebrospinal fluid (CSF) or blood but occasionally from joint, pleural, or pericardial fluid or fluid from another normally sterile site.
    - Isolation from urine, sputum, or pharyngeal swab does not meet the case definition.
  - Gram negative diplococci visualized on gram stain of CSF
  - Positive antigen test for meningococcus performed on CSF
- Invasive meningococcal disease includes meningococcal meningitis, meningococcemia, and other illnesses caused by *N. meningitidis* in a normally sterile site. Pharyngeal colonization is not considered invasive meningococcal disease.
- Signs and symptoms include:

– Fever	– Photophobia	– Petechial rash
– Intense headache	– Rigid neck	– Shock
– Nausea/vomiting	– Delirium	– Coma

### **Occurrence** (Wisconsin-specific data are included on page 3)

- Incidence in United States: 0.8-1.3 cases per 100,000 population per year
- The peak incidence is in late winter to early spring.

### **Disease severity**

- The case-fatality ratio of invasive meningococcal disease is 5-15%
- 11-19% of survivors have neurologic or other sequelae such as hearing loss or limb loss

### **Transmission**

- *N. meningitidis* colonizes the pharynx of asymptomatic persons (up to 5-10% of population in countries with endemic disease).
- Only a small minority of persons colonized with *N. meningitidis* develops invasive meningococcal disease.
- Transmission occurs via **direct contact with oral or nasal secretions**. The following exposures are examples of direct contact with oral or nasal secretions:
  - Kissing
  - Sharing water bottles
  - Sharing eating or drinking utensils
  - Sharing a communion cup
  - Sharing cigarettes
  - Performing airway management
- Incubation period: 2-10 days, generally 3-4 days
- Period of communicability
  - *N. meningitidis* is communicable when it is present in oral secretions.
  - Case patients are considered to be infectious from 7 days prior to illness onset until 24 hours after initiation of appropriate antibiotic therapy.
- The majority of cases are sporadic, fewer than 5% of cases are related to an outbreak.
- Clusters of transmission: Determining the serogroup and pulsed field gel electrophoresis (PFGE) pattern of *N. meningitidis* isolates is crucial for identifying clusters of transmission.

### **Persons at increased risk for developing invasive meningococcal disease**

- Children younger than 5 years of age
- Persons with certain immune deficiencies
- Persons who have had a splenectomy or have abnormal spleen function
- Adults initiating living in close quarters
  - College freshman living in residence halls
  - Military recruits
- Persons who had direct contact with the oral or nasal secretions of an invasive meningococcal disease case patient during the period from 7 days prior to illness onset until 24 hours after initiation of appropriate antibiotic therapy
- Household, child care, or nursery school contacts of an invasive meningococcal disease case patient. The attack rate for these contacts is more than 300 times the attack rate in the general population.

- Medical personnel who had direct contact with oral or nasal secretions of a case patient such as during airway management or endotracheal intubation
- Travelers with prolonged contact to populations in countries with epidemic meningococcal disease
- Cigarette smokers
- Persons who recently had an upper respiratory infection

### **Prevention and control measures**

- Reduce direct contact with oral and nasal secretions .
- Promptly report cases of invasive meningococcal disease to the local health department (LHD) and Bureau of Communicable Diseases, Wisconsin Division of Public Health (DPH).
- Ensure appropriate chemoprophylaxis of persons who had direct contact with the oral or nasal secretions of an invasive meningococcal disease case patient. Generally, when done correctly, relatively few persons will need to receive chemoprophylaxis.
- Closely monitor persons who had less direct contact with a case patient for signs and symptoms of meningococcal disease. Promptly evaluate and treat as necessary.
- Reduce overcrowding in college residence halls and military barracks.
- Consider meningococcal vaccine for persons at increased risk. The quadrivalent polysaccharide vaccine available in the US is immunogenic against serotypes A, C, Y and W-135 although it is relatively ineffective in persons <2 years of age.

### **WISCONSIN MENINGOCOCCAL DISEASE DATA**

- During 1993-2002 an annual mean of 46 cases (range: 36, 54) of meningococcal disease among Wisconsin residents were reported to DPH.
- Of the cases reported to DPH during 1993-2002 the mean case-fatality ratio was 12% (range: 8, 18).
- During 1993-2002 the serogroup was determined in 306 (66%) of the 462 reported Wisconsin cases. The following are the number of cases caused by the three most common serogroups and the percentages of the total isolates with known serogroups:
  - Serogroup Y, 101 cases (33%)
  - Serogroup B, 99 cases (32%)
  - Serogroup C, 96 cases (31%)

**GUIDELINES FOR WISCONSIN PUBLIC HEALTH RESPONSE** (Refer to the Roles and Responsibilities Section on page 6)

1. Ascertain clinical history and how diagnosis was made.
  - a. Clinical signs and symptoms
  - b. Date of illness onset
  - c. Laboratory test results
  - d. Determine if the case patient is a college or technical college student
    - What year in school is the student?
    - Does the student reside in a residence hall?
    - Had the student received the meningococcal vaccine?
    - Was the appropriate student health service notified?
2. Ensure that infection control professionals (ICP), LHD, and DPH personnel are notified about a case as soon as the case is suspected.
3. Ensure chemoprophylaxis of persons with direct contact to case patient.
  - a. The following antibiotic regimens are appropriate for chemoprophylaxis of direct contacts

**Table 1 Antibiotic regimens that effectively eliminate nasopharyngeal carriage of *N. meningitidis* by antibiotic agent with dosage and price information**

Agent	Dose	Price* \$ median, (range)	Comments‡
Rifampin	Adults: 600 mg po BID x 2 days Children $\geq$ 1 month: 10 mg/kg po BID x 2 days Children < 1 month: 5 mg/kg po BID x 2 days	22 (20, 34)	Not recommended during pregnancy Stains urine and tears; avoid contact lens use
Ciprofloxacin	Adults only: 500 mg po x 1 dose	11 (5, 25)	Not recommended during pregnancy or lactation
Ceftriaxone	Adults: 250 mg IM x 1 dose Children < 15 years: 125 mg IM x 1 dose	25 (20, 75) 25 (20, 75)	May be mixed with 1% xylocaine to reduce injection pain

\* Prices rounded to nearest dollar, obtained by surveying 5 Wisconsin pharmacies, February 2003.

Prices do not include administration fees.

‡ Antibiotics can decrease the effectiveness of hormonal contraceptive methods

This chart was adapted from CDC. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(no. RR-7).

- b. Timing of chemoprophylaxis
  - Ideal to provide chemoprophylaxis within 24 hours of case patient's diagnosis.
  - Chemoprophylaxis administered >14 days after exposure to case patient provides no benefit.

c. Who requires chemoprophylaxis

- Household contacts of a case patient. For college students, this includes persons who live in same dorm room but not those who live in the entire residence hall.
- Children  $\leq 5$  years of age who attend daycare or nursery school with a case patient
- Persons who had direct contact with the oral or nasal secretions of a case patient during the period from 7 days prior to illness onset until 24 hours after initiation of appropriate antibiotic therapy
- Military personnel sharing the same sleeping space with a case patient
- Medical personnel who had direct contact with oral or nasal secretions of a case patient

d. Persons and places to consider when identifying contacts who need chemoprophylaxis

- |                     |             |                                  |
|---------------------|-------------|----------------------------------|
| • Family            | • Workplace | • Social and sports events       |
| • Friends           | • School    | • Church and other organizations |
| • Intimate partners | • Daycare   | • Medical personnel              |

*\* If possible, talk to friends of adolescent aged case patients—parents might not be aware of intimate partners and other direct contacts.*

e. Aircraft contacts: Risk of exposure to *N. meningitidis* on aircraft is related to the duration of the flight and the seating proximity to the case patient.

- Personnel from the airlines, Centers for Disease Control and Prevention quarantine stations, DPH, and LHD should collaborate to determine the identities and risk of aircraft passengers and crew members.
- For flights  $>8$  hours, including ground time, passengers seated in either seat next to the case patient should be considered for chemoprophylaxis.
- For flights  $\leq 8$  hours, there is likely not enough time for unrecognized direct exposure to oral or nasal secretions of the case patient.

f. Contacts of a person with meningococcal pneumonia

- Meningococcal pneumonia, in the absence of meningitis or bacteremia, is not considered invasive meningococcal disease. However, meningococcal pneumonia can occur with invasive meningococcal disease.
- Although communicability is a theoretic possibility, no data exist to support the chemoprophylaxis of direct contacts of case patients who have meningococcal pneumonia without evidence of invasive meningococcal disease.

4. Ensure terminal prophylaxis of case patient. Antimicrobial therapy of invasive meningococcal disease with agents other than a third-generation cephalosporin or ciprofloxacin might not reliably eliminate nasopharyngeal carriage of *N. meningitidis*. If the case patient wasn't treated with a third-generation cephalosporin or ciprofloxacin, ensure that the case patient receives one of the three antibiotics in Table 1 to eliminate nasopharyngeal carriage (terminal prophylaxis) prior to discharge from the hospital.
5. Communicate with healthcare providers and the public in a timely manner to assure appropriate chemoprophylaxis of contacts and avoid inappropriate chemoprophylaxis
6. Ensure that a culture isolate of *N. meningitidis* (if available) is sent to Wisconsin State Laboratory of Hygiene (WSLH) for serogroup testing.
7. Enhance surveillance for additional cases by communicating with healthcare providers and the public as necessary.
8. Review historical data and investigate links between cases.

## **ROLES AND RESPONSIBILITIES**

### **Hospital Infection Control Professionals/Clinicians**

1. Notify LHD about a confirmed or suspected case of meningococcal disease as soon as the case is suspected. Do not wait for laboratory confirmation. Provide LHD with details about the clinical history and laboratory evaluation.
2. Identify medical personnel (including EMTs) directly exposed to case patient's oral or nasal secretions; arrange for chemoprophylaxis for these persons.
3. Ensure terminal prophylaxis (see Guideline 4. above for explanation).
4. Request that the laboratory send a culture isolate to the WSLH for serogroup testing.

### **Local Health Department**

1. Notify DPH about confirmed or suspected case expeditiously.
2. Collect clinical information. If case patient is a college student, collect information about year in school, type of residence, and vaccination status.
3. Determine how diagnosis was made and collect available laboratory data.
4. Identify household and community contacts of case patient that need chemoprophylaxis.
5. Advise appropriate contacts of case patients to see their healthcare provider to receive chemoprophylaxis. If contacts have no insurance, direct to alternate provider.
6. Communicate with local healthcare providers and the public to ensure appropriate chemoprophylaxis of contacts and enhance surveillance for cases of invasive meningococcal disease.

7. As needed, enhance surveillance for additional cases via MD alert, letter to parents of school or daycare attendees, and meetings at workplace or college residence hall.
8. Ensure that *N. meningitidis* isolate (if available) is sent to the WSLH.

### **Wisconsin State Laboratory of Hygiene**

1. Serotype the bacterial isolates and notify DPH of results.
2. Perform PFGE on bacterial isolates, if requested by DPH.

### **Bureau of Communicable Diseases, Wisconsin Division of Public Health**

1. Review clinical and laboratory data if case status is in doubt.
2. Assist in determining which persons need chemoprophylaxis.
3. Enhance surveillance for additional cases, as needed. Provide templates of letters to the LHD (e.g. letters to parents of children in school or daycare, letters to workplaces).
4. Coordinate investigation and communication if multiple counties are involved or if a non-state resident is affected in Wisconsin.
5. Confirm that the bacterial isolate is submitted to the WSLH.
6. Request PFGE analysis of select isolates when a possible link is identified.
7. Advise about further testing, if necessary.
8. For case affecting a college student, complete the college student supplemental form and fax it to the CDC.
9. Review historical and prospective data and investigate links between cases.
10. Determine if other control measures are indicated, such as the use of vaccination.

General number for DPH staff during weekdays (608) 267-9003.

### **References**

CDC. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(no. RR-7).

American Academy of Pediatrics. Meningococcal infections. In: Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003:430-6.

CDC. Exposure to patients with meningococcal disease on aircrafts—United States, 1999—2001. MMWR 2001;50(23):485-9.

Meningococcal infections. In: Chin J, ed. *Control of Communicable Diseases Manual*. 17<sup>th</sup> ed. Washington, DC: American Public Health Association; 2000:340-5.